THE TEXTILE WORLD RECORD
KINK BOOKS

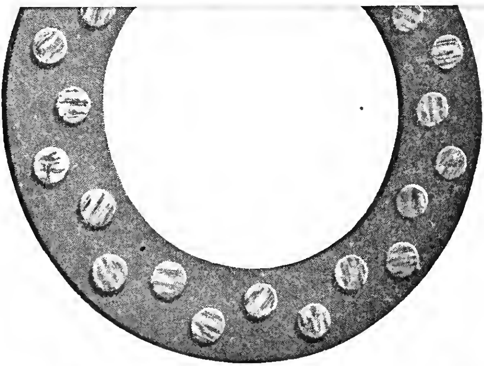
No. 5.

Kinks for
Boss Weavers

Compiled from the
QUESTIONS AND ANSWERS DEPARTMENT
of the
TEXTILE WORLD RECORD

PRICE 75 CENTS

LORD & NAGLE COMPANY
Publishers
Boston, Mass., U. S. A.



FOR LOOM FRICTIONS

Textile world

THE TEXTILE WORLD RECORD KINK BOOKS

No. 5.

Kinks for Boss Weavers

From the

QUESTIONS AND ANSWERS DEPARTMENT

of the

TEXTILE WORLD RECORD

Compiled and edited by

CLARENCE HUTTON

LORD & NAGLE COMPANY
Publishers
Boston, Mass., U. S. A.

PREFACE

In compiling this book the aim has been to give the unusual, out-of-the-way information on the problems of weaving overseers which results from long experience.

The editors of the TEXTILE WORLD RECORD are at all times face to face with the problem of securing practical information. For years its subscribers have been invited to make free use of its columns in asking questions relating to textile manufacturing and it occurred to us that if some of the most important and most interesting of the practical questions that have been answered were gathered together in a handy form for quick reference it would meet a widespread want.

This book is the result. It contains information which has been supplied by manufacturers, superintendents and overseers from their private record books and their stores of knowledge gained by experience. Many questions are answered and much information given, but subscribers should remember that if there is any information they desire which is not given in this volume, it is their privilege to ask the Questions and Answers Department of the TEXTILE WORLD

RECORD and every effort will be made to publish the information they want, provided the question is one of general interest to the trade.

No effort has been made to group the questions and answers relating to the different branches, such as cotton, woolen and worsted, in any part of the book. The index has been carefully prepared, however, and its use should enable anyone to find the information he seeks in the shortest possible time.

Grateful acknowledgement is due to the men who have supplied the information, and if Kinks for Boss Weavers should benefit any of the large number of men for whom it is intended, both they and the publishers will feel that its mission has been accomplished.

TEXTILE WORLD RECORD,
Lord & Nagle Company,
Publishers.

KINKS FOR BOSS WEAVERS

The Management of a Weave Room

Will you give me some advice regarding the management of a weave room? I have just succeeded in getting a position as overseer and a few hints would be helpful. Young Overser (1803).

"The first hour of the morning is the rudd r of the day." This is especially true in the weave room and one of the overseer's most important duties is to see that the weave room help, second hands, loom fixers, weavers and other operatives are on hand at the time for starting work. Getting in late is a serious fault of the help in many mills and few realize what a great loss it causes to the company. The loss of a few minutes in the morning and at noon time means a loss of many yards in the daily production. The overseer should arrive before the time of starting and stand near the door of his room so he can see the help as they come in and be seen by them. He will not find it necessary to say a word to them for when they see him on the lookout they will make it a point to avoid being late. It is a bad plan to depend on the second hands to look after this important matter. The second

hands should see that the looms are started on time and also report any weavers that are out.

The overseer should also keep a watch for looms waiting for weavers and use every effort to get them started as soon as possible. I do not believe in the so-called doubling up to keep the looms running. The overseer should find out the cause of each weaver's absence and have a list of spare weavers that he can call on in such an emergency. It is a very good plan for an overseer to have the addresses of all the operatives under his supervision. He should keep posted regarding the number of warps running out and the number that are expected to come into the room, arranging the work for the fixers so that it will be distributed throughout the day and not come all in a heap. While looking after these matters he can see whether the warps are in proper condition, and if not, apply the remedy at once. The spinner is often blamed for bad warps when the spooling and dressing room is responsible. After the yarn leaves the spinner it can be pulled to pieces in spooling and warping and ruined in the sizing. It takes but a few bad warps to demoralize the best of weave rooms.

The overseer should keep close track of the reports from his deparment so that he may know just how the different styles are distributed among the looms. The reports should be sent to the office as early as possible so that the superintendent can keep in close touch with the

work of the mill and make his report to his superiors. When making these reports of production any bad work or shortage of warps or filling should be noted in order that all in authority may know of anything wrong and apply the remedy if possible. The overseer of weaving should be able to detect bad work and quickly determine its cause. To do this he must understand the processes not only in his own department, but also the preceding and subsequent processes of manufacture. The production of the weave room depends in great measure on the good work done in the preceding processes For this reason the utmost care should be given to the manufacture of the yarn and its preparation for the loom.

He should pay special attention to the management of the loom fixers. If they do good work he should tell them so, as this goes a long way toward stimulating them. Under no circumstances should he allow the fixers to be rude and discourteous to the weavers. Every fixer should be made to understand that he must respond promptly and pleasantly when the weaver calls him. The trouble may be trifling and caused by the weaver herself, but regardless of this it is the fixer's duty to go to the loom, investigate for himself and apply the remedy.

Gamaliel Gaunt

Calculating the Weight of Filling

If a fabric is woven with three kinds of filling of different counts, how is the weight of each filling per yard or cut calculated?

Rock Island (707).

The number of yards of each size of yarn is first found. Then the weight is calculated from the length and yarn count. The operation is best explained by an example:

Ex. A cloth is woven 65 inches wide with 24 picks per inch. The filling pattern consists of 48 picks divided as follows: 6 picks 1/20s cotton, 8 picks 3 run woolen, 10 picks 2/36s worsted. Find weight of each kind of yarn per yard.

65 (inches) × 48 (picks) = 3,120 yards filling. Allow 5 per cent. for take-up as the filling is usually woven slacker than when reeled:

3,120 (yards) ÷ .95 (100% —5 %) = 3,284 yards of yarn per yard. The 3,284 yards is then divided in the proportion in which the three kinds of yarns are found in the filling pattern, as follows:

6 picks 1/20s cotton	=	821	yards.
8 picks 3 run woolen	=	1,095	yards.
10 picks 2/36s worsted	=	1,368	yards.
		3,284	yards.

Next step reduce the cotton and worsted counts to runs and calculate weight of each kind of yarn:

1/20s cotton 10.5 Runs.
2/36s worsted = 6.3 Runs.

821 (yards) ÷	1050 (yds. per oz.)	=	.78 ounces.
1095 (yards) ÷	300 (yds. per oz.)	=	3.65 ounces.
1368 (yards) ÷	630 (yds. per oz.)	=	2.17 ounces.
			6.60 ounces

The reduction of cotton and worsted counts to runs or yards per ounce is made as follows:

Cotton No. × .5 1/4 = Runs.
Worsted No. × .3 1/2 = Runs.

Standard Length and Width of Cloth for Testing

Will you please advise me what standard, if any, of length and width of cloth is used in testing machines for determining the strength and elasticity of the fabric? Western (1,110).

There is no official standard in the United States for the size and standard of cloth to be tested for strength and elasticity. The size mostly used by the United States Government and others is a sample long enough to fit in the jaws of a testing machine so that the jaws will be one inch apart when ready for the breaking load. The width of the sample should be one inch. The jaws of the machine are in many cases also one inch wide. In the testing of khaki cloth by the other departments of the United States Government the sample tests are cut

four inches long and the full width of the cloth and the tests made in one-inch grips or jaws placed one inch apart and in the center of the sample. This is called "testing in the cloth".

A large mill that makes cotton fabrics uses a piece two inches wide and long enough to fit in the jaws of the machine so that the distance between the grips or jaws will be three inches before the strain is applied. The sample cloth is unraveled on each side equally to reduce the perfect cloth as nearly to one inch in width as the picks or ends will allow. The jaws in this case are two inches wide.

In England the Manchester Testing House cuts a sample of cloth about twelve by seven inches and then tearing out the side threads sufficiently to reduce the sample to a width of six and five-eighths inches, and when placed in the jaws of the machine they will be six inches apart. This size is the standard for the Government of Great Britain.

The German Government uses a sample of cloth three inches wide and long enough so that the jaws will be five inches apart.

It is unfortunate that the early testing machines in this country adopted one-inch jaws as wider jaws would give more equal results.

Planet.

Wire Heddles

I would like information on the following points regarding German tinned steel wire heddles for fancy weaving.

1. What is about the average life of heddles made of No. 28 wire and used on No. 30 yarn?
2. Is it considered good practice to use heddles until they break or wear out?
3. If heddles should be discarded before they wear through or break, how am I to tell at what point it is advisable to throw them out and put in new ones?

We have been using wire heddles for about ten years, and so far as I know the entire equipment of heddles has never been changed, although new ones have been bought from time to time to replace those lost or broken. Our work where we use the heddles is not running as well as it should, judging by results we get from the same yarn running with steel harness. It occurred to us that the trouble might arise from worn heddles. We have accordingly examined a large number of them under a magnifying glass and find that the solder is worn out from the bottom and top of the eyes, but the wire shows no sign of wear or cutting.

Heddle (1040).

It is very difficult to determine the life of heddles, as a great deal depends on the yarn used. If a coarse yarn or a yarn that has not been properly sized is used, the heddles will not last long, about one year at the most. If the yarn is smooth the heddles should last about two years. Of course a great deal depends on the weave of goods that the mill makes. It is not a good practice to use heddles until

they break or wear out. The heddles will not wear out at the eye, but will wear at the harness rod. They get bent over and will catch the yarn, causing pick-outs and poor cloth. When the solder is worn off it is time to discard the heddles. In the process of weaving the yarn goes from top to bottom of the eye in every movement of the harness and it is the top and bottom of the eye that does all the work. If the yarn is gritty or lumpy it takes but a very short time before nicks will be worn at the top and bottom, in which the yarn will catch.

New heddles should never be put on the same frame with the old ones or with heddles that are partly worn. When one of the old heddles breaks at the top, bottom or in the eye, the weaver takes the reed hook or scissors and will twist and screw until the broken heddle comes out, often bending the new heddles out of shape. The heddles that are taken off can be looked over and the best of them used to fix up other frames that are in fair condition.

Heddles are a very important factor in the weave room and should be well taken care of. When the drawing-in girl starts a new warp she should look the harness over, putting them on the frame one at a time. If any of the heddles are tied up with twine or yarn they should be broken off and a small piece of waste wet with oil rubbed over the top and bottom rods. This will make the heddles move easier and keep them from rusting. The heddle rods in the frame

are in most cases held up by two small hooks, sometimes by only one in the center. If they are screwed up too high they will in time cause the heddle to break at the top or bottom. All heddles should move freely on the rods, so in building a new set of harness these hooks should be attended to first. Bad spooling, slashing, web drawing and fixing, along with poor fixing, are the causes of two-thirds of the bad cloth that comes from the weave room, and the overseer should be looking out for this all the time. Another thing that may help him is that the reeds might not be deep enough for the rise and fall of his harness, thus causing the yarn to bind at the top and bottom of the reed. The fixers may have the reeds set more on one side than on the other so that the yarn will not pull straight from harness to fell of cloth. N. B. Y.

The so-called German heddle being a substitute for the old time cotton and worsted harness is naturally a little harsher on the yarn, but is the best of the metal heddles used in weaving, with possibly one exception. Two pieces of wire are used to form the eye. There is naturally a tendency for the yarn to wear the solder that is used to make a smooth eye and heddle, no matter how well the work may be done. Hard yarn with very little softening will shorten the life of a heddle, and with yarn of this kind a heddle will not last longer than a few weeks. On the other hand, if a soft yarn is used the heddles will last for years. The manner of

fixing and setting the harness has a great deal to do with lengthening the life of a heddle. If the harness is too tight or too loose on the bar it will very often destroy the eye. The threads double up at the eye and this strain takes the life out of the heddles. Uneven setting of the harness frames will destroy the eye of the heddle sooner than anything else, and this in addition to having too large a shed is one of the most difficult features to be met with in the use of wire heddles.

It is not good practice to use heddles until they wear or break, as the drawing-in of warps is an item of cost in a mill, and it often happens through carelessness, oversight or accident, that warps are drawn in, taken to the weave room, started up, and then have to be cut out again, because of defective heddles. It is not always easy to detect a defective heddle and they sometimes can be found only by a small piece of the fiber clinging to the eye. It is a good plan to have a boy or girl examine all the harness before they are placed in the drawing-in frame, replacing all that are unfit for further use. A few good heddles may be discarded, but this is cheaper than having the smash piecer devoting several hours to replacing the heddles. Sometimes broken heddles will escape detection until they are in the loom, but if examined properly this seldom happens. Practical.

Poor Light in Weave Room

In a weave room should there be any falling off in production in the darker parts of the room?
Hampton (1039).

In nearly every weave room there are light and dark places, but as far as the production goes, the same amount should be obtained from one loom as from another. We know that all weavers are looking for the best looms and the best light. If "Hampton" will watch the weavers in the dark places he no doubt will find that they keep their looms running just as well as in any other part of the weave room, although the quality of work may not be so good and it is done with greater strain on the weaver.

It might be well to have the lights arranged so that the dark part of the room can be lighted without having to light the rest of the room. Another way is by getting the weavers in this part of the room to run six looms instead of eight or ten. In every mill there are weavers who do not care to have so much work and are ready to take less looms, but still want to get off a good production. There is no excuse for not getting as much from one loom as from another. It is advisable to put the best running work on the dark looms. Overseer.

The Loom Brake

I have noticed that the looms in some woolen and worsted mills are equipped with the brake, while in others the brake evidently has been taken off. Can you tell me why some mills continue to have their looms equipped with these different devices? Connelly (1540).

The benefits derived by the use of this very important attachment to the loom are much greater than they are often considered to be. Like all other improvements the brake has had to fight its way against prejudice and ignorance. It met with many failures only to be proven a success and, like the stop motion, it will eventually triumph. In some mills the brake attachments have been placed on one or more looms, these looms very often being unsuitable on account of oily friction, too fine a tooth on the counter picker and crank shaft. Under these conditions the results have not been satisfactory and the brake has had to bear the blame when the real trouble was not with the brake. While some mills are discarding the brake because they could not get good results, other mills are giving repeat orders for them.

Given a fair trial the brake will do all that it is claimed to do, but to have success it is essential that conditions should be right. There should be a coarse tooth drive on the loom, good friction and a first class center filling stop motion. Under these conditions the brake will stop the loom on the pick that breaks or runs

out and will stop it in such a position that there will be no loss of time or danger of making imperfect cloth or causing a mark. Consider for a moment what this means. I know that there is an average of one minute between the time of starting a loom with a brake attachment and one without. One minute is too small to be worthy of consideration were it not that the filling is likely to break a good many times during the day, and when the weaver is running two looms the filling is very apt to run out quite a number of times in the course of a day. The frequent loss of one minute means a loss of four or five yards of cloth per day on 40-pick work, and more or less in proportion to the number of picks.

Then the effect of the brake on the waste question is worthy of consideration. As an illustration let us compare the loom without a brake and the loom with a brake attachment. On the former every time the filling breaks or runs out the weaver must go through the following movements: 1. Carry shuttle across from the box it is in to the box it came from; 2, uncouple head motion; 3, pull out reverse knob; 4, turn head gear; 5, put in shuttle; 6 and 7, place head gear and reverse gear in position; 8, let out take-up gear. Then after using all possible caution there is danger of making imperfect cloth or causing a smash. And while all these movements are being made the weaver will probably have forgotten to keep an eye on the other loom, which may be making poor cloth and causing more waste.

If the filling breaks or runs out on a loom that is equipped with a brake, all that is necessary is to release the brake, pull back the lay, put in the shuttle and the loom is all right again. The brake also affects the waste question in another way, as on the no-brake loom the weaver is more likely to change the filling before it is quite ready, wasting ten or more picks of filling than on a brake loom.

Now let us note how much more work can be accomplished by the weaver when he has the brake to help him, how much easier the work is done and how much more comfort there is in weaving with two looms. These are items worthy of consideration. The better the con ditions are for the weavers the more likely the mills are to get good weavers and the mills that get the best weavers stand in good position to get the best results all round.

Another item of importance especially at this time when many mills are obliged to take in learners (and any one who knows anything about a weave room knows what a trouble they are for at least six months) is that it requires less experience to find the pick and start up the loom with the brake. The cost of the brake is so small as not to be worth consideration and the same applies to keeping it in repair.

It is reasonable to suppose that every addition to the loom means more parts to be kept in order and so more work for the fixer, yet a fixer can take care of as many looms with a brake

attachment as without. If a loom without a brake requires fixing, the belt must be taken off nearly every time, but with the brake loom this is not necessary. Here is a saving in belting, for every time the belt is taken off it means a shortening of its life. The loom can be made more secure by putting on the brake. Neither is the brake loom so dangerous to the fixer as the no-brake loom.

Another point to be gained by the use of the brake loom may be illustrated as follows: Suppose we are weaving a two up and one down weave, how much quicker a weaver could detect a broken thread, a wrong draw or any other imperfection in the warp threads. This style of cloth can be woven one up and two down, or filling flush, without danger of making miss-picks, but to weave this cloth on the no-brake loom we should lose more by getting misspicks than would be gained otherwise. There are various styles of cloth that it is better to weave face down, but this can be done to much better advantage on a loom with a brake than on one without, as on the latter the misspicks are difficult to see. Marathon.

Constant for Train of Loom Gears

Kindly give me the constant from the following particulars: Loom ratchet wheel, 92 teeth; pinion wheel, 16 teeth; sand roller, 14 inches; sand roller gear, 94 teeth; bottom gears 37-18

(the 18 gear is never changed); cloth woven 80 picks per inch.

I can get only 4 picks for every tooth changed in pinion wheel; i. e., 80 picks for 16 pinion; 76 picks for 17 pinion. I want 74 picks but cannot get it. We are using Colvin looms.

Bristol (797).

The constant from this train of gears would be:

$(92 \times 94) \div (16 \times 18 \times 14) = 2.144$ Constant.

Picks ÷ Constant = Gear. $80 \div 2.144 = 37.3$ Gear.

I see that "Bristol" makes no reference to the take-up in the cloth from reed to roller and the least we have ever allowed has been 1 3/4 per cent. I find the difference between the quotient from the train of gears and the number of picks is between 1/2 and 3/4 per cent. for take-up. Assuming that this must be the amount of take-up on the loom, I find that by changing the tin roller gear to 87, the constant will be practically 2, so that the change gear would then be 37 for 74 picks. We have changed such gears when placed in the same position as "Bristol" mentions; in fact I think that either of the two larger gears have been changed at some time in the past.

Will Nelson.

Textile Analysis

Will you state the best method of determining from a small sample the weight per yard and the size of the yarn of which it is composed? I have frequent occasion to analyze competing

fabrics and need a simple method adapted for the mill, by which I can determine quickly and accurately the construction of a textile fabric. Please illustrate your method by a fabric weighing 3.75 grains per square inch, having 108 ends of warp and 96 picks of filling per inch.

Manufacturer (564).

A sample with an area of 4.32 square inches (1/300 square yard) is cut by a die, which for that purpose may be 1.8 in. by 2.4 in. or 1.2 in. by 3.6 in. The weight of such a sample at the inch rate given by Manufacturer is 16.2 grains. This grain weight indicates the weight in ounces per yard 52 1/2 inches wide, that is, 16.2 ounces. The weight for any other width is calculated by simple proportion. Thus for 56 inches:

$(16.2 \times 56) \div 52.5 = 17.3$ ounces per yard 56 in. wide.

The size of the yarn by the cotton system (840 yards per pound) is calculated by dividing the threads per inch by the weight of the sample (4.32 sq. in.) in grains. The 108 ends of warp and 96 picks of filling combined make 204 threads per inch both ways.

Then:

204 (threads) $\div$ 16.2 (grains) = 12.6, average cotton No.

If the sizes of warp and filling are to be found separately the sample is raveled and each kind of yarn weighed. Assuming the warp to weigh 8.7 grains, the filling 7.5 grains the sizes are found as follows?

108 (threads) ÷ 8.7 (grains) = 12.4, cotton No., warp.

96 (threads) ÷ 7.5 (grains) = 12.8, cotton No., filling.

If the size by the worsted system is wanted, multiply the cotton size by 1 1/2; if by the cut or linen system, by 2.8; if by the run system, by .525. Thus for the average size:

12.6 × 1 1/2 = 18.9, average worsted No.

12.6 × 2.8 = 35.3, average linen No.

12.6 × .525 = 6 5/8, average runs.

If the sample contains yarns of different sizes in either warp or filling, the count of each is found by counting and weighing each kind and calculating the size separately. Assume for example that every third thread of warp is of a different size from the rest, and that this yarn which we will call A, weighs 3.2 grains. Then:

36 (threads per inch) ÷ 3.2 (grains) = 11.2, cotton No., A warp.

In the case of special sizes like the preceeding, the count can also be found as follows: Assuming for example, there are 86 special warp threads in the width of 2.4 inches, each 1.8 inches long, the total length of the yarn will be 155 inches. Then:

155 (inches) ÷ 3.2 (grains) = 48.4 inches per grain.

48.4 (in. per grain) ÷ 4.32 (inch-grain basis of cotton count) = 11.2, cotton, No., A warp.

This is a system of analyzing textile fabrics that the editor of the Textile World Record has tested for many years in mill work. It is simple and accurate, enabling the busy designer or manufacturer to determine the construction of most fabrics in 15 minutes to half an hour. The selection of an area of 4.32 square inches is due to the fact that the cotton No. indicates the number of 4.32-inch lengths per grain. The count as calculated indicates the size of the yarn as it lies in the cloth. To determine the spun count, allowance must be made for take-up, shrinkage in length and loss in weight between loom and case. If the goods are weighted the sample should be scoured and dried before the analysis.

Removing Rust from Reeds

We would like to get some preparation that will remove rust from fine reeds, say 90 to 100 dents per inch. Marshall (1042).

I have frequently had occasion to remove rust from various iron and steel articles and although I have never tried it on reeds, yet the good results obtained in other cases leads me to believe that it is worth while testing it in the cleaning of reeds. Pieces of ordinary zinc are attached to the article to be treated, which is then put in water to which a little sulphuric acid has been added. It should be

left there until the rust has entirely disappeared, the time depending on how deeply it is rusted. If there is much rust a little more sulphuric acid should be added occasionally. The essential part of this process is that the zinc must be in good electrical contact with the steel or iron that is to be cleaned. A good way to manage this is to twist an iron wire tightly around the piece and connect this with the zinc. A battery zinc is the best to use as it has a binding post.

Besides the simplicity of this process it has the advantage of not having the iron or steel attacked in the least as long as the zinc is in good electrical contact with it. Delicate pieces of mechanism which have become badly rusted, can be cleaned by wrapping a galvanized wire around them instead of the zinc, in which case the acid should not be too strong. When the rust has all disappeared the articles will appear a dark green or blackish color. They should then be thoroughly washed and oiled and it is well to warm them slightly when dry so that the oil may sink into the surface. Since your question was received I have tried this process on a small piece of reed, which is sent to you under separate cover. It was badly rusted and you will notice that now it is very clean.

James Chittick.

Care should be taken that the reeds do not get rusted. If the wire is deeply rusted re-

place the reed with a new one; if only slightly damaged, put on a little oil and take a tapered piece of hard wood and work upon the reed in the direction of the wire. Also take a piece of pumice stone and use it in the same way. Then finish by using fine emery cloth and a good stiff brush.
Hargraves.

Weave Room Waste.

I would like some consideration of waste made in a weave room, giving the causes, the estimated expense from it and methods of prevention.
Mitchell (1800).

The question of waste is one of vital importance to the manufacturer, and worthy of his careful consideration and constant attention. There is a peculiar interest attached to this question in connection with the work in the weaving department, because the amount of waste made in weaving is more largely influenced by the discipline of the help employed, than is the case in the other departments of the mill; and also because the value of the stock is greater in this department than in either the carding or spinning, the other departments that contribute most largely to waste production. In this connection we may also say that the expense of rendering the weave room waste available for future use is greater. Not only does the labor cost in each depart-

ment add a corresponding value to the stock as it goes forward, and is consequently of greater value here than in the earlier processes, but it represents the best part of the stock. In the carding, the waste produced is largely composed of the poorer portions of the stock, being heavily loaded with dead fibres and dirt which is of little or no value, and the elimination of which is of real value to that remaining.

The yarn from which the weave room waste is made is therefore better in quality than in its original mixture, and has been enhanced in value by the expense in labor to produce it, and all that can go into the cloth will be still further enhanced in value, while that which is wasted at once depreciates, often to the amount of more than 50 per cent.

When we come to look at it in this light, we wonder that the subject is sometimes given so little attention in the mills. The fact is, the responsibility is too often misplaced, and the weaver is blamed, when the fault is in the laxity of the management. To be sure, the weaver makes the waste, and whatever portion of it is unnecessary must be largely due to his methods; but he is not responsible for his methods being allowed. What seems to be his carelessness may be due to the need of better discipline or system to avoid the trouble.

It is a question whether the most intelligent weaver ever stops to think that the yarn which he so thoughtlessly pulls from the bobbin to

throw into the waste box, is thereby reduced 50 per cent. in value. He is usually paid for his labor by the yard, and there is always a tendency to overlook other interests, and to sacrifice them to his own advantage, especially if he is not restricted by proper discipline.

The habit of changing shuttles before the bobbin is empty, and of changing two or more to save the trouble of stopping the loom again when only one of them is sufficiently reduced or "run out", proves to the interest of the weaver so far as production is concerned, as well as in relieving him somewhat from the close attention required to watch each bobbin, and see that the filling "runs out" before changing. It is sure, however, to produce unnecessary waste and corresponding loss to the mill.

How this habit can best be checked is a question that presents itself to the overseer of the weave room.

Some mills have adopted the method of limiting the weaver to a specified amount of waste per day or week imposing fines for any in excess of the amount. This method has never proven successful, as it creates a bad feeling among the help and offers a temptation on their part to "do away" with evidences of their carelessness; and the waste floating down the stream has evidenced the desire of some to try to appear within the limit at an additional expense to the manufacturer.

Then again, this method is likely to prove

unjust, as the really conscientious weaver with "bad work" might have to suffer the penalty in spite of his best efforts, while the dishonest and unworthy one would find a way to evade the consequences of his carelessness.

It is quite impossible to say what amount of waste per loom would be permissible, as it depends largely upon the class of work and the quality of the stock used. As a rule the lower the grade of work the greater the percentage of waste. I have before me the report of results showing the average in two first-class mills on entirely different work, that shows something of this variation.

One mill is running on a low grade of fancy goods with perhaps an average of 15 per cent. of wool and the remainder shoddy, with yarns ranging from 1 1/4 to 3 runs, while the other uses all wool, chiefly on white work, with yarns ranging from 3 to 6 runs,—an average of about 5 runs.

In the former mill the amount of filling waste per loom is 5.62 lbs. per week, while in the latter it amounts to only 1.52 lbs. per week.

The mill referred to as making 5.62 lbs. per loom is running 52 looms, and by figuring the amount of this kind of waste for one year, upon the above basis, we find it amounts to 15,196 lbs. which at an estimated value as low as 26 cents per pound for the stock made into yarn, amounts to $3,950.96. The deprecia-

tion of at least one half, by its conversion into waste, amounts then to $1,975.48.

Now if this is the result of fairly good management, as it seems to be, it may readily be seen what a source of leakage would follow an excess of waste in a medium or large sized mill; it is not unreasonable to suppose that the waste question has often had quite an influence on the condition of mills that have had "hard sledding."

The mill on the all-wool work is making a very creditable showing in this matter, and the man in charge at the mill on the low stock says he could not reduce the average except at the risk of a loss in production or the danger of the weaver's "doing away" with the waste as a result of too much hounding on the subject.

Even upon the same class of work, there are often conditions to cause a variation from the different looms, and while it may not be policy to set a limit for the weavers, it is certainly worth while, in striving to correct abuse, to keep a record of the result from each loom in order to draw fair and intelligent conclusions regarding the work of the individual weaver. Where it seems that the amount of waste is excessive, it will be best to watch the weaver's methods to ascertain whether he is at fault, and if he is found to be so, it can best be remedied by correcting him at the loom, rather than to criticise blindly the result of his week's work. In the latter case he would certainly offer an excuse, while he

could not dispute the evidence when presented before his eyes.

The overseer who knows from week to week the amount of waste made by the individual weaver, as well as the average, will be able to estimate very nearly what the result of honest endeavor should be, and also readily determine where to look for the abuses. When corrected right at the loom, there will be little chance to evade the responsibility, or to shoulder it on to a neighbor. When each weaver understands that the overseer is observant of his methods, as well as the weekly results, there will be a constant tendency to seek approval by honest rather than unfair methods. By a constant feeling that justice will be done, there will be a growing tendency toward better methods and desirable results.

In justice to the weaver, however, it may be said that oftimes he is not wholly responsible for excessive waste. The condition of the yarn when it comes from the spinning room is often responsible for much of the waste that is made in the weave room. Imperfect yarn, bad building of the bobbin and soft bobbins, caused either by inferior stock, imperfect mixture or neglect in the carding or spinning room, often lead to the accumulation of weave room waste, despite the best efforts of the weavers. All these matters should be taken into account, and corrected at the right place.

In this connection it may be said that the weavers should be taught to lay aside such bobbins

as are likely to cause trouble, not only that the overseer may know the true condition of the work but that they may be rewound if expedient, and thus avoid the necessity of consigning them to the waste. When the help are taught the true importance of this question, and feel they are individually under the watchfulness of the overseer, and that care in the matter is as important as production, it will be easy to continue the discipline.

Elmo.

Selvages of Carbonized Piece Goods

I am informed that the selvages of piece goods are often protected from the carbonizing process so that the fancy effects in the selvage are retained in the finished goods. How is this done? Does it require any special machine?

Stimmen (345).

In order to protect the selvages of carbonized goods from the effects of the process they are saturated with an alkali solution by means of a brush or sponge after the pieces have been soaked in the acid and extracted. The alkali solution should be of sufficient strength to neutralize the acid in the selvage. The work must be very carefully done in order to secure uniform results and in order to prevent the alkali from soaking into the edge of the piece.

Goods are treated in this manner to but a very slight extent in this country but we understand that in Europe the method is used to a greater extent.

Estimating Size of Yarn

How is the spun size of the yarn calculated from the finished size? Can the take-up in length be determined by pulling out a thread for a certain distance in the cloth, then stretching it out and noting the difference between the woven and finished lengths? Is this plan feasible for worsted goods? Werdau (648).

The spun size is estimated from the finished size by making allowance for such changes in length and weight as may have taken place from the time the yarn was spun until the cloth was finished. These changes vary in number and degree in different fabrics, and for determining them one must rely on judgment and experience.

Pulling a thread from a fabric, stretching it and noting the difference should never be adopted in the case of woolen and worsted goods, as it is impossible to stretch a fulled thread to its spun length. Practically all worsted yarn felts more or less during the finishing process.

Efficiency of Looms.

How is the percentage of production calculated for a weave room? (High Speed 418.)

Owing to the unavoidable loss of time caused by stopping the loom to mend broken threads, change shuttles and warps, etc., the actual production of a loom is always less than it would have been if the looms ran without interruption. If

the efficiency of a weave room is 70 per cent. it follows that the looms have been idle or not engaged in cloth production for 30 per cent. of the time. This percentage is calculated by dividing the number of picks in the cloth actually woven by the number of picks the looms would make if running constantly.

Example: Fifty looms run 90 picks per minute for 58 hours producing 6,700 yards of cloth having 52 picks per inch.

50 (looms) × 90 (picks per minute) × 3,480 (minute per week) equal 15,660,000, picks per week (theoretically).

6,700 (yards) × 36 (inches per yard) × 52 (picks per inch)equal 12,542,400, picks per week (actually).

12,542,400 ÷ 15,660,000 = 80 1/10 per cent.

This calculation can be simplified by using a constant number in place of the four constant factors, number of looms, picks per minute, minutes per week, and inches per yard. In the above calculation the product of the first three is divided by the fourth, thus: (50 × 90 × 3,480) ÷ 36 = 435,000, constant. The efficiency is calculated by this constant as follows:

6,700 (yards) × 52 (picks per inch) ÷ 435,000 (constant) = 80 1/10 per cent, efficiency of looms per week.

When the cuts vary but slightly in length the average picks for any given time can be found by adding the number of picks per inch in each cut

and dividing the total by the number of cuts.

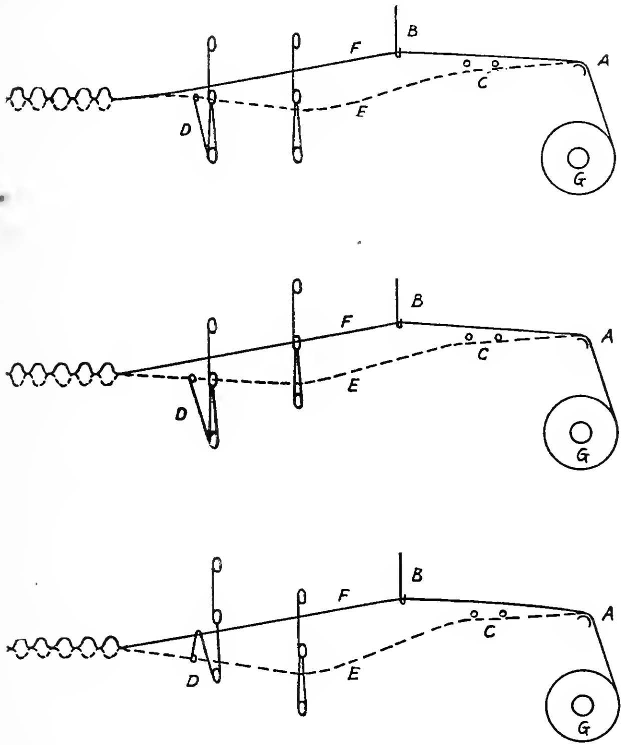
The record of production is usually kept in the weave room in such form that this method involves very little labor. The constant number remains unchanged as long as the number of looms, speed and running time are constant. Having this constant number a weave room overseer can calculate the percentage of efficiency in a few minutes. This is an invaluable means of determining the efficiency of a weave room and should be used in every weaving mill.

Split Selvages

I would like to obtain information regarding mock selvages that is selvages in the center or in any part of the cloth. Brantford (1044).

Split selvages are used to weave two narrow cloths in a broad loom. The difficulty of making a split is to make a centre selvage which will not allow the warp threads to unravel after the cloth is cut into two narrow widths. There are several mechanical devices for making a good split selvage, but I will illustrate two which have given good results. The first one is worked after the principle of a leno thread as shown at Figs. 1, 2 and 3. Fig. 1 shows the harness level. Fig. 2 shows the harness when doup is straight, and Fig. 3 shows the doup crossed; a, the whip roll; b, the elastic for keeping the ground thread up; c, the lease rods; d, the doup; e, the doup thread; f, the ground thread.

The split threads are generally made of ply yarns, 2/40s or 3/60s, slashed on the same beams as the regular yarn, two threads for each selvage.



FIGS. 1, 2, AND 3.

The illustrations show the construction of one of the selvages, the other is drawn in the same manner. A single dent is left empty for space to allow the knives to cut without damaging the cloth.

If two dents were left empty the space would be too great and would cause a bad selvage after the cloth is cut.

The split threads after leaving the beam come over the whip roll, then the ground thread passes over the lease rods and the doup thread being always down and the ground thread up it is easier on the yarn and dóes not break as often. The ground thread after passing over the lease rods is held up by a wire hook (b) which is attached to the loom by a piece of elastic which allows the thread to be pulled down a little while the doup is over the ground thread. The doup thread is drawn underneath the eye of the back harness, thus allowing the harness to pull the thread down but not lift up, and then through the eye of the doup. This doup is made of a very fine steel chain about 1/16 of an inch in diameter. There is a great deal of wear and tear on the doup, and the chain will last about four weeks and costs from 6 to 12 cents per loom.

This motion is mostly used on ordinary light plain cloth.

Crompton & Knowles Loom Works sell a very good motion for split selvages which would do for any cloth, whether light or heavy. Fig. 4, represents this motion. It is attached to a stand which is bolted to the arch of the loom. Fig. 5 is attached to Fig. 4 by bolt, H. Fig. 6 shows how it looks when on the loom. The motion is in the center of the loom in front of the harness and behind the reed. Arms, I, are fastened to

the harness straps by a narrow piece of leather, L. The two threads of the selvage are drawn through

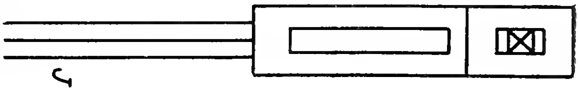


FIG. 4.

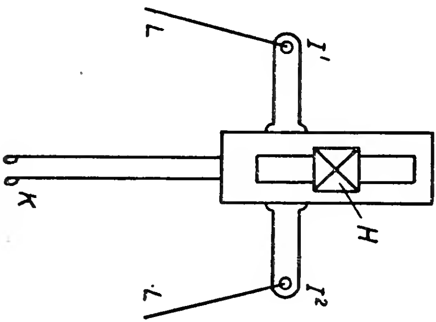


FIG. 5.

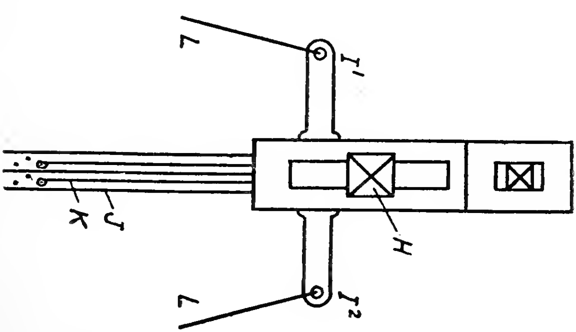


FIG. 6.

the wire dents or grate, J, attached to Fig. 4, and the crossing threads are drawn through the eye of the needle, K, on Fig. 5. Arm 1^1 is attached to the front harness and arm 1^2 is attached to the back harness.

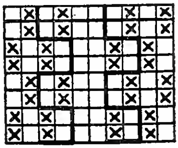


FIG. 7.

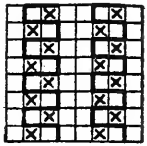


FIG. 8.

When the front harness is pulled down arm 1^1 is pulled down, bringing the needles, K, to the right hand side of grate, J and bringing the crossing threads at the right hand side of the selvage threads. When 1^2 is dropped the needles are pulled back to the left making a stitch in the selvage. Figs. 7 and 8 show the effect on the cloth.

Denmark.

Filling Waste

How much filling waste should be made in weaving goods with 3 1/2 run filling? York (520)

The following statement shows the amount of filling waste made for a series of consecutive weeks in a weave room where 4-run filling was used on three-fourths of the looms and 2-run filling on the other fourth. The total weight of the cloth woven

and the percentage of waste based on this weight are also given.

Week ending.	Pounds cloth woven	Filling Pounds.	waste. %
May 25	6,115	212	3.4
June 1	4,935	125	2.5
June 8	6,123	115	1.9
June 15	7,136	117	1.6
June 22	6,899	133	1.9
June 29	6,586	118	1.7
July 3	3,150	42	1.3
July 13	6,733	125	1.9
July 20	4,116	102	2.5
July 27	5,943	120	2
Aug. 3 and 10	16,989	329	1.9
Aug. 17	8,554	157	1.8
Aug. 24	7,926	148	1.9
Aug. 31	7,849	149	1.9
Sept. 7	6,072	127	2.1
Sept. 14	7,910	165	2.1
Sept. 21	7,666	148	1.9
Sept. 28 and Oct. 5	12,562	254	2
Oct. 12	6,424	116	1.8
Oct. 19	6,404	125	1.95
Oct. 26, Nov. 2 and 9	19,935	374	1.87
Nov. 16	6,903	155	2.24
Nov. 23	6,995	127	1.81
Nov. 30	5,815	152	2.62
Dec. 7	7,520	149	1.98
Dec. 14	5,986	131	2.18
Dec. 21	7,105	148	2.08
Total	206,351	4,163	2.01

This list begins with the first week for which a statement was kept and it is interesting to note the marked reduction of waste from 3.4 per cent. to 1.9 per cent. as a consequence of the efforts of

the overseer to prevent an excessive amount of filling waste. This illustrates the value of such statements in keeping the overseer constantly informed regarding the exact amount of waste made in his room.

Twisting-In Warps

Is there an economy in the practice of twisting in warps on plain work? Panama (680).

From my experience I should say that there is an economy in twisting in plain warps. If a loom fixer runs his section and does all the changing without the aid of a helper it is economy not to twist-in, as he can then change a warp in less time than if it is twisted, especially if there are a large number of ends in the warp. When a spare fixer does the changing it is better to have the warps twisted-in for a twister is usually paid by the piece and so the loom will not be idle as long when changing the warp and no spare fixer will be needed. Henry Owen.

I do not think there is any economy in twisting in warps on plain work unless it is on looms equipped with drop wires, then the cost of wiring up the new warp will be saved by having it twisted in the loom. On looms without wires the warps can be drawn in 20 per cent. cheaper than twisting them in, besides the advantage of a thoroughy clean harness and reed on each drawn warp.

Clinton.

Oiling and Cleaning in Weave Rooms

What is the usual method for oiling and cleaning weaving machinery? Is it done by the weavers or by special help employed for that purpose? Perry (569).

In mills where plain looms are used it is customary for the weavers to do their own cleaning and oiling. On fancy work or on jacquards or on Draper looms, or where warp stop motions have been installed and the weavers are required to look after a large number of looms, the oiling and cleaning is usually done by men or boys hired for that special purpose.

From Manchester, N. H., a correspondent writes: "In all the mills in this city the weavers do their own cleaning and oiling."

From Rhode Island: "In these mills the weavers do the cleaning and oiling, but special help is employed to clean and oil the jacquard heads, which are over the tops of the looms."

From Massachusetts: "In all the mills in which I have worked it is usual for weavers to oil their looms once a week, generally on Monday. They have to clean their own looms and are generally allowed an hour on Saturday morning for that purpose. When they are on piece work many of them clean the looms during the noon hour on Friday. The exceptions to this are where Draper looms are used or where stop motions have been installed. In such cases men or boys go around early in the week and do the oiling and in the latter part of the week do the cleaning."

From a Connecticut overseer: "I have been an overseer in three mills and in all of them the weavers did their own cleaning and oiling. In some mills where they have the Draper looms special help is hired for this purpose. In fancy mills the fixers have done the oiling and I think this is the best plan as quite a good deal is saved in oil cans and oil. A good many weavers think their looms won't run well unless they have as much oil on the floor as on the loom. Cleaners are not necessary where the weavers run only from two to eight looms. I have been in the weave room for thirty years and always did my own cleaning."

From a Massachusetts mill: "When the weavers run four, six or eight looms each they have to clean and oil their own looms. I find it much better to have them do so as they are more interested in their own looms than a cleaner would be, the latter being cheap help earning about $5.00 per week. On Draper looms one man cleans and oils 208 looms. A number of our looms are equipped with electric stop motions and one man cleans and oils 150 of these. My weavers on Draper looms run from 16 to 20; on the looms with electric stop motions they run from 10 to 12."

From a New Bedford mill: "On fancy work with dobby heads our weavers run four, five and six looms and do their own cleaning, oiling and sweeping. The weavers on the jacquard looms clean, oil and sweep with a boy to oil and clean the heads over the looms. On plain work on the Northrop loom our weavers run 16 looms and

have a boy to clean, oil and sweep for each 104 looms."

From a sheeting mill: "The weavers clean and oil their own looms and do their own sweeping. It has always been so in all the cotton mills where I have worked. We keep a chore hand to do the sweeping and scrubbing of the spare floor and to separate the waste, that is, to take the clean waste from the dirty, so it can be more readily graded in the waste house. He also looks after the weavers' oil cans and sees that they are kept full and in good condition. After twenty years of more or less experimenting I have found that this way gives the best satisfaction to the office and the help."

Sizing for Worsted Warp

Please publish a recipe for a good size for single worsted warp. Benn (834).

A good size for worsted warp is made with 4 ounces of good glue and a gallon of water; for single worsted I would use 4 ounces of glue and 2 ounces of Irish moss to a gallon of water. This requires two tanks, as it takes a long time to boil the mixture, and one must be in course of preparation while the other is being used. Pitman.

Curled Selvages

Can you suggest a remedy that will help us to overcome the difficulty of curled selvages in

3 and 4-leaf twills? We enclose samples of the 4-leaf twill cloth, showing the goods and selvages before and after finishing. As the goods leave the mill the selvages lay out perfectly flat, but the finisher claims that as soon as they are wet the selvages curl, making it almost impossible to finish the goods. Our yarns are standard twist and the filling is laid into cloth without any extra tension in the shuttles.

Lincoln (553).

One of the greatest troubles in a dyehouse or bleachery is curly selvages, that is, cloth on which the selvages begin to curl as soon as it is wet and before the dye vat is reached, resulting in the under part of the curl not being dyed, and creating an endless amount of complaint because it is practically impossible to straighten them out again.

In looking at the gray sample it is at once apparent that the selvage is too narrow and not properly drawn in. Only six threads are used for each selvage, and these are drawn in two in an eye in the twill weave, making what is known as a wire edge, and it is almost impossible to keep such selvages from curling.

A machine is built through which the cloth is run just before reaching the dry cans in order to straighten out the edges of the goods. This machine consists of two brass rolls, geared together and running in opposite directions, and grooved in such a manner as to make it impossible for these curly edges to get past Scrimp bars are also used in this way with some success, when the selvages are not too narrow. In

some mills where the cloth has two runs in the process of dyeing, the difficulty is sometimes met by running the cloth face downward on the first run and face upward on the second run, but this attempt to prevent the curling is only successful in mild cases.

The best and about the only way to keep out these curly edges is to go back to the weave room and make what is known as a tape selvage. This is done by means of a plain weave (one up and one down). In mills where the looms are equipped for only four harness work an attachment can easily be applied to supply the two harnesses necessary for the selvages, without interfering with the arrangement of the cams for a twill weave. In making this tape selvage the filling is looped at the bottom, and not at the top, as is the case with the samples referred to. Gloucester.

The curly selvage trouble is a very common one, especially in twilled cloth where plain selvages are most desired. The cause is, in great measure, conditional, and a close study of the draught, loom and filling is necessary to locate the remedy. By examining the two samples I should think the filling and draught were at fault. The selvage is drawn in cordy. If the warp is strong enough, draw every thread in warp single; if not, then draw six to eight double threads in harness and reed, straight draw. If warp reeds do not fill up the whole reed, leave most spare reeds at filling motion side. If the cloth is woven three up and one down, set harness cams three inches from fell

of the cloth, and if one up and three down, two inches will be about right. If curled selvage is on filling motion side, notice carefully the weight of the fork. Do not use too much friction in the shuttles. Do not put more turns of twist in the filling than 3 to 3.15 times the square root of count. When using cop filling a straight shuttle eye will sometimes remedy the trouble. I have seen the trouble stopped by dropping the back whip roll.

Shandon.

All selvages that are drawn in similar to the sample enclosed have a tendency to curl. There is a thick ridge, particularly on one side, caused by the peculiar manner of drawing in the threads. Two doubles lie under the others and make a double selvage which can be overcome by straight drawing in. On drills coarse threads must be avoided. When the cloth becomes wet these threads have a tendency to draw and cause the selvage to curl. By coarse threads I mean individual threads that are very prominent, forming a ridge. I have overcome this fault by drawing in an occasional single thread near the outer edge of the selvage.

Will Nelson.

From the samples submitted I should say the selvage was not strong enough and that the threads were drawn in wrong. You do not say whether a twill or a plain selvage is required and therefore I am somewhat at a loss what to say. I have woven something similar, 108 by 48, 12 1/2 yarn and 15s

filling with only one double thread for the selvage and I never had any trouble with the selvages. I have had sateens curl at the selvage and the only way I could remedy that was by skipping a dent between the body and the selvage, then drawing in a dent and skipping another and so on. I should recommend this method if a good selvage is required. Dan Ready.

The only complete remedy for the trouble found in finishing four-leaf twills is to have a plain selvage put on both sides of the cloth. As the cloth is now woven, the outside end on the selvage is woven in by the filling every fourth pick., while once in four picks there are three ends that are on the outside of the selvage and which do not interlace the filling, thus making a very ragged and loose selvage. Owing to the construction being heavier in the warp than in the filling the natural tendency of the cloth when placed in water is to shrink. The cloth curls toward the back because of the open character of the weave on that side.

If the cloth is examined under the microscope it will be noticed that the selvage ends are all crowded together. When the outside end is crossed by the filling it is pulled over the next three ends and the shrinkage of the filling when wet is sufficient to cause the rolling of the selvage to continue When it gets a start there is no means, short of a tentering machine, to keep it straight.

By using selvage motions the selvage ends can be made to interlace the filling in plain weave or-

der. This will also permit the selvage harness to be set so that the filling will be engaged and held by the warp while it is being brought up by the lay, and still be able to set the beat-up of the body of the cloth wherever it is best for weaving.

If it is desired to avoid using selvage motions the selvage could be improved by drawing in the selvage threads on the first and third harnesses only, which would make the selvage weave with a plain intersection. By this arrangement every other pick would not be woven in the selvage, but would be drawn to the body of the cloth. The improvement from this change would consist in the fact that when the filling was woven into the selvage every other end would be up or down and thus give double the number of intersections. This would prevent the shuttle from causing the selvage to roll, which is the first and real cause of the selvage rolling when being finished.

Arthur Dyson.

Calculating Number of Picks

We are making cotton warp horse blankets. The filling measures 55 yards to the ounce, the weight of the blanket being regulated by the picks per inch. The orders give the size in inches and the weight in pounds, thus:

500 blankets 84 inches long, 76 inches wide, 4 1/2 pounds.

I would like to know how to calculate quickly and accurately the number of picks required to give the required weight. We have but a

few different cotton warps, that for the 4 1/2-pound blanket being 1800 ends 8s cotton. The blankets are finished dry, stretch 5 per cent. and lose about 3 per cent. in finishing. A blanket 76 inches wide is woven 84 inches wide in the loom. E. Venzo (616).

Estimating the warp take-up in weaving at 4 per cent. the number of picks per inch is found as follows:

72 (ozs. in 4 1/2 lbs.) ÷ 2 1/3 (yds. in 84 in.) = 30.9 ozs. per running finished yard.
30.9 (ozs.) × 1.05 (100% + 5 % stretch) = 32.44
32.44 ÷ .97 (100% — 3 % loss) = 33.4 ozs. per running woven yard.
1800 (ends) ÷ .96 (100% — 4 % take-up) = 1896 yds. warp.
1896 (yds. warp) ÷ 420 (yds. 8s per oz.) = 4.5 ozs. cotton warp per yd.
33.4 (ozs.) — 4.5 (ozs.) = 28.9 ozs. filling per yd.
28.9 (ozs.) × 55 (yds. filling per oz.) = 1590 yds. filling per yd.
1590 ÷ 84 (in. wide) = 19 picks.

In this case we would advise making the lay-out 22 picks and then watching the weights and correcting any irregularity by reducing the number. This will prevent the first blankets from being too light.

Single and Double Knot Harness

What is the comparative life of single and double knot harness? Ringgold (679).

I have found very little difference in the length of time a harness will wear, whether single or

double knot. Each has its good qualities, but under different conditions. Clinton.

I have found that a single knot harness will last almost as long as a double knot harness, that is, a single knot usually lasts from five to eight years, and a double knot from five to ten years, if they are treated with a good varnish. Henry Owen.

Effect of Moisture in Yarn

We are running 120 looms on worsted and cotton worsted goods, buying all the yarn required and have difficulty with the variation in the weight of the goods, especially the woven weight per yard. For example, one standard grade of our worsted goods is made with 2/30 warp and filling. Two months ago this fabric weighed about 16 ounces per yard from the loom and finished about 14 1/2 ounces without any change in length. Today we are making the same fabric from a different lot of 2/30 yarn bought from the same spinner, and the goods average about 17 ounces per yard from the loom and, curiously, finish about 14 1/2 ounces with no change of length, the same as with the old lot of yarn. Following are the particulars of two average pieces made from different lots of yarn.

Old lot, woven 45 yards, 16 ounces.
Finished 45 yards. 14 4/10 ounces.
New lot, woven 48 yards, 17 1/10 ounces.
Finished 48 yards, 14 4/10 ounces.

At present we are weaving about 2,500 yards of this style per week. What is the reason for this variation in the woven weight? Neither the fabric nor the process of finishing has been changed. Perplexed Weaver (500).

From the foregoing statement of the case there can be but one conclusion. The new lot of yarn contains a larger proportion of moisture, oil or other material beside wool. The excess of foreign material is removed by the finishing process which leaves the finished weight the same in both cases. This is shown as follows:

Cut from old lot, woven, 45 pounds.
Finished, 40 1/2 pounds.
Loss, 10 per cent.
Cut from new lot, woven 51 1/4 pounds.
Finished, 43 1/4 pounds.
Loss, 15 8/10 per cent.

In other words, for every 100 pounds there was 5 8/10 pounds more oil or water in the new lot of yarn than in the old lot. As the fabric was made with the same number of ends and picks per inch it follows that the new lot of yarn must have reeled heavier than the old lot, before weaving. The fact that the finished weight is the same in both cases indicates that the variation of the woven weight is due to an excess of moisture and not of oil. If there had been an excess of oil the spun yarn would have reeled the same because the oil is applied to worsted in the combing room and the yarn is spun in the grease. The excess of oil would thus have caused no change in the woven weight, but the removal of the oil by finishing would cause the finished goods to weigh less than when made of yarn carrying a smaller quantity of oil. This, however, is not the case with the

pieces referred to, and we are, therefore, forced to the conclusion that the increase in the loss of weight by finishing is due to the presence of 5 8/10 per cent. more moisture in the new lot of yarn than was in the old lot.

Wool is extremely hygroscopic, probably more so than any other textile fibre of commerce. It has been estimated that some grades of wool will absorb 30 to 40 per cent. of moisture without feeling damp to the touch. This fact makes it possible for unscrupulous persons to load raw and partly manufactured wool with an excess of moisture and thus obtain the price of wool for water. This loading of wool materials with moisture is usually accomplished by storing in a damp cellar. Other methods are available, such, for example, as the one we once found a wool dealer practicing. Entering unexpectedly the loft in his country store in the West we found him standing in the center of a pile of wool industriously sprinkling water over the stock with an ordinary garden sprinkler.

This evil has been reduced to a minimum in Europe by the process of conditioning, which consists in determining what the weight of the textile material would be if it contained the legal standard of moisture. On the Continent conditioning houses are organized and managed under legal restrictions, and their decisions are authoritative in commercial transactions. In England a conditioning house was established in 1895 by the Manchester Chamber of Commerce. In the United States we have the New York Silk Con-

ditioning House. The legal standards of moisture adopted on the Continent are as follows: Worsted, 18 1/4 per cent.; woolen yarn, 17 per cent.; cotton, 8 1/2 per cent.; flax and hemp, 12 per cent.; jute, 13 3/4 per cent.; shoddy yarn, 13 per cent., all based on dry weight. For example 118 1/4 pounds of conditioned worsted contains 18 1/4 pounds of moisture.

The different standards are made necessary by the variation in the water absorbing capacity of the various fibres.

The conditioning of textile materials sold in the United States has been neglected. This has doubtless been due to a number of causes, among which may be mentioned the great distance separating mills, which makes access to a central conditioning house expensive; to the indifference of those who are injured by a lack of a standard of moisture; and to the natural disinclination of dealers to surround commercial transactions with restrictions.

The importance of conditioning is well illustrated by the case of Perplexed Weaver. He is now making 2,500 yards per week of one style alone, and on the basis of the two pieces noted he is buying for this part of his production 145 pounds of water per week at the price of worsted yarn. We do not know what the cost of the yarn is but if only 75 cents he is paying $108.75 per week for water which he thinks is wool, or at the rate of 4 1/3 cents per yard. The chances of loss in this way are greater with wool than with other

textile materials, owing to the greater power of wool to absorb moisture.

In the absence of conditioning establishments buyers of yarn can in a measure guard against this species of fraud by carefully reeling the yarn as soon as it is received and again after exposing it to a certain temperature for several hours, then noting the losses.

An excess of oil can be detected by scouring by hand the reelings used for the water test and noting the additional loss. These tests are necessarily crude, but will serve as a guide in the absence of reliable conditioning establishments.

Ends Sticking Together in Sized Warps

How should heavily sized warps be handled to prevent them from sticking together

Morton (678).

If the warps are run slowly over the slasher and thoroughly dried, and separated on the slasher with the proper amount of softener, there will be very little trouble with sticking together in the weave room. I have used warps sized as high as 25 per cent. in this way. Clinton.

Warps can be prevented from sticking together by using a 1 1/2-inch back lease and putting soapstone on the warp. Morgan.

The slasher should be sure the yarn is dried before it is run on the beam, and the leases put in

right, otherwise the ends will stick together. On heavily sized warps the leases should be put in after doffing every beam. If there should be a smash, for instance a few threads broken out, the lease should be put in or they will stick. It is probable that the difficulty lies in the leases when the warps are run on the beam. Howard.

The steam pressure should be from 10 to 15 pounds for coarse yarn, or when a large number of ends are being run for the warp, and also when the slasher is run at a high speed. Fine yarn with the same size and the same number of ends, say 2000 or more, requires a lower pressure; 5 to 10 pounds is used, with 8 pounds as the average. The brushes under the slasher are circular, covered with a good grade of long bristle, and come in contact with the damp warp immediately after leaving the size roll in the box. By revolving at a suitable speed they improve the feel and appearance of the sized warps, especially fine yarns or colored work, where a distinct weave effect is required in the fabric. The slasher cylinder should be kept clean at all times, and when stopped at night the size rolls and squeeze rolls should be washed down with cold water, the immersion roll raised out of the size box, the squeeze rolls taken from contact with the size rolls and the steam shut off the cylinder. The comb at the front of the slasher should have from 7 to 11 dents per inch.

The separating rods play an important part in preventing the yarn sticking together, they divide

the warp into as many sheets as there are section beams in the creel, and as the warp passes through the expansion comb it divides the ends into 300 to 500 groups of ends with the group in each dent consisting of one end from each section beam, and not more than two threads should be put in one dent. If these suggestions are carried out there will be no trouble with the yarn sticking together and it will make a good yarn to weave.

Henry Owen.

There are several ways to treat sized warps according to how heavy the size is put on. One method is to have the back lease rod about three times the diameter of the ordinary lease rod, and this is all that is necessary unless the size has been laid on extra thick. By increasing the size of the lease rod the yarn is separated before it gets close to the rod and thus prevents its bunching as it would do if only an ordinary lease rod were used. With a small rod the point where the yarn begins to separate is so close to the lease rod that it will bunch up close to the rod and break out. With the large rod the point of separation is farther away.

Another method is to have two flat lease rods fastened together by spring hinges and used for the back rod instead of the ordinary round one. With the working of the harnesses these two rods open and close and the yarn is thus separated as it comes from the beam.

For very heavily sized warps it is well to use

an extra lease rod in the same lease as the back rod. This extra one is attached to the lay with a wire and to the whip roller with a spring so that the rod moves forward and back with the lay and keeps the yarn well separated. Dan Ready.

Calculating the Width of Cloth in the Loom

I notice that the loom reed for cotton goods is often figured by subtracting 1 from the number of threads per inch finished, and dividing the remainder by the number of threads per dent.
For example:
Find the reed for a 64 sley cotton cloth with 4 threads per dent.

$(64 - 1) \div 4 = 15\ 3/4$ reed.

Some calculators take 5 per cent. from this remainder:

$15\ 3/4 \times .95\ (100\% - 5\ \%) = 14.96$

In this case they would use a 15 reed.
This practice is confined to the cotton industry. I wish you would explain why they deduct 1 from the number of threads per inch finished.
Ego (398).

The practice of calculating the reed referred to by Ego is purely arbitrary. Cotton goods are woven wider than the finished width in order to allow for contraction due to take-up after weaving and the allowance of 1 thread per inch is made for this purpose. It does not answer for all cases because the take-up varies with the size of the yarn and the weave, as well as with the number of threads per inch, consequently the difference of 1

between the finished and loom set of cotton fabrics may be right for one weave or size of yarn and wrong if the weave or size of the yarn is changed.

A better practice is employed in the woolen industry where the loom width is first determined by making what is considered the necessary allowance for take-up. The threads per inch in the loom are then calculated from the total number of ends and the required width.

Ex. A cloth to be finished 55 inches wide is to be laid 75 inches wide in the loom with 4 threads per dent. There are 3,000 ends in the warp. Find the reed required.

$3000 \div 75 = 40$, threads per inch in the loom.
$40 \div 4 = 10$, reed.

This is the best practice for calculating the reed for cotton as well as woolen goods, as it is based on a preliminary estimate of the proper allowance to be made for take-up.

The wide variation in the loom width of woolens and worsteds on account of the shrinkage due to fulling explains why the arbitrary method mentioned by Ego is not used for these goods.

We referred Ego's question to a practical cotton goods manufacturer who makes the following reply:

"While many men in the cotton industry make a practice of deducting 1, yet it is not the only rule used, and in fact is not nearly as good as it is claimed to be. Personally I prefer a method similar to that used for worsteds. Where the reasons for deducting 1 from the sley comes in I do not

know, as it is manifestly impossible for one to get good results thereby. It stands to reason that the higher the count, the more the shrinkage, and yet by deducting 1 from 100 you get 1 per cent., while 1 from 50 means 2 per cent. The second calculation is nearer the mark. I object to the 1 at the start, but uphold the 95 per cent. idea. This is the rule that is in general use, but it is not a good rule nevertheless.

"My rule is to find the number of ends to be used. For instance on a 100 × 100, 40 inch goods, it would take 4,000 ends to give the required cloth. From 24 to 36 ends are used as doubles for the selvage, and thus 3,976 ends are available for use in finding the reed. The next thing is to determine the shrinkage of the cloth, and to do this we must know the counts, weight, filling and kind of weave, as all these have an effect on the shrinkage. Then again with stop-motions a little more width must be allowed, so that on a 100 × 100, 7 yards, 40 inch goods, we should need about 43 1/4 inches in the reed.

3,976 ÷ 43.25 = 91.93, threads per inch.
91.93 ÷ 2 = 45.96, reed or 46 dents per inch or:
4,000 — 24 = 3,976.
3,976 ÷ 2 = 1,988, dents required.
1,988 ÷ 43.25 (width required) = 45.97 reed or 46.

This rule is similar to that for worsted and woolen goods and the only one worth considering when correct results are wanted, but in many mills they use the other for the sake of uniformity and allow extra ends where the shrinkage is greater, thus

giving more than the required sley; when the shrinkage is less they take out some ends, and in the end come out about even. Arthur Dyson.

I was much interested in the query of Ego relating to calculating the width of cloth in the loom, and the answers given to it. In my opinion, the method of using the cloth sley minus 1 × .95, is to provide a sliding scale on the theory of high sleys contract less than low sleys. Taking the calculation of Arthur Dyson for 100 × 100, 40-inch goods, 2 ends per dent:

(100 — 1) × .95 = 94 ends per inch in reed, giving 47 reed with 2 ends per dent. This would allow for a contraction of 6 per cent. Take a fabric of 50 sley, cotton cloth, using the same method as previous example:

(50 — 1) × .95 = 46.5 ends per inch in reed, or 23 reed with 2 ends per dent. This would allow for a contraction of about 8 per cent.

The example cited by Arthur Dyson, 100 sley, 40 inches wide, would call for 2,000 dents; allowing 24 extra ends for selvage would give a warp for 4,024 ends reeded as follows:

ends.				
12	doubles	=	 6	dents
3976	singles	=	1988	dents
12	doubles	=	 6	dents
4024	ends in		2000	dents

2000 dents ÷ 47 reed = 42.55 inches width of cloth in reed. East Hill,

Loss Due to Filling Waste

Can you give me a fair average of the difference in value of yarn on the bobbin and in the form of waste, including cotton, woolen and silk? Mansfield (357).

There are so many grades of cotton, woolen, worsted and silk yarn that it would be impossible to give an average of the difference in value of yarn on the bobbin and in the form of waste. This difference would have to be estimated separately for each kind of yarn and depends in a great measure upon the cost of the raw material; the higher this is the greater is the difference between the value of the yarn and the waste.

Depreciation is caused by inability to rework the waste into its original form. Take fine worsted yarn for example. This can be made only of long, fine combed wool. When once spun into the form of yarn it cannot be torn up and reworked into the same grade of yarn, but must be manfactured on the carded woolen system and spun into coarser and cheaper yarn, which is used for a low grade of goods.

As the value of the raw material is lowered, the margin between the value of the yarn and the waste from it decreases until a point is reached where the yarn waste is practically as suitable for reworking as was the material from which it was originally made. In such a case the loss caused by waste consists in the cost of converting the raw material into yarn. This is an im-

portant item, and includes not only the cost of the manual operations such as coloring, carding and spinning, but also the cost of fixed charges of the mill including rent, taxes, insurance, watchmen, repairs, interest, etc., as well as the loss resulting from decreased production caused by the yarn going into waste instead of into the form of cloth.

There is no doubt that if a careful estimate was made of the loss caused in the mills throughout the world by turning filling yarn into waste, some startling results would be reached. This is evident from the case of the small mill operating sixty looms, in which the loss due to filling waste amounts to $9,000 per year. Cotton yarn, unless twisted very soft, is of no value for reworking into yarn, and the same loss is very large on silk yarn. It would take much time and involve much labor and research to make even an approximation of this loss, which in the aggregate is enormous.

Filling waste is the most promising field for economy in the textile industry. The present wasteful methods are not seriously felt, because they have always existed. The only way to partially remedy the difficulty at present is for the overseer to give his personal attention to the matter, day in and day out. This is a very difficult thing to do, as it is impossible for an overseer to keep every weaver constantly under his eye. Consequently when the weaving overseer becomes unusually vigilant in this respect, the weavers are likely to pocket the waste, carry it out of the

mill and destroy it. When the overseer comes around and finds a small quantity in the mill he is gratified at the showing, while the manufacturer is worse off than if the waste had been left in the mill to be reworked into other goods. Dearborn.

Determining Number of Yards on a Beam

Can the number of yards in a cut be figured from the beam on the loom, when the diameter of the barrel and length of beam and size of the yarn are known? Will the amount of size in the yarn have to be considered and the number of picks? Williston (746).

We do not see how it would be possible to determine the length of a cut from the size of the yarn on the beam. The number of cuts depends not only on the length of the warp, but on the length of the cut, and a short warp may contain as many cuts as a long one providing the length of the cuts is made to correspond.

If Williston intends to ask whether the length of the warp can be determined from the size of the empty and full beams then the question becomes more susceptible of a reply. If the yarn is wound on the beam at a uniform density the volume or cubic capacity of the yarn would bear a constant relation to the length of the warp. The tension varies, however, and consequently the density of the yarn on the beam varies with it; for this reason it would be necessary to have data as to the number of yards of warp in a cubic inch or

foot of beamed yarn on which to base the calculations of the length from the size of the beam. By this method of estimating, the amount of size need not be taken into consideration. The number of picks in the cloth has nothing to do with the length of the warp on a beam.

Reed Marks

Enclosed is a sample of our finished ginghams, which is reed marked? These goods are made with a 50s warp and 56s filling. Can these marks be prevented? Is there any way to take them out in the finishing process? Daniels (935).

The sample of gingham sent me is very badly marked. So many things might cause it that it is difficult to say which one is responsible in this particular case. The whip roll may be too low; the breast beam may need a strip of wood to make it higher; the harness cams may not be set on proper time. I would suggest that the whip roll be raised and that a strip of wood be placed on the breast beam, say about 1/4 of an inch thick and about 1 inch wide. This will help to put a better face on the cloth, giving the yarn a chance to spread. If this does not give the desired result then set the cams so the harness will change about 1 1/2 inches from the fell of the cloth. Do not weave too loose nor too tight. The overseer and second hands should be on the constant lookout.

I have had twenty-two years' experience on this class of goods and think if these suggestions are followed the cloth will come out all right, although as I have said before, so many things might cause the trouble that it would be impossible to give a definite opinion without seeing the looms in operation.
Gammaliel Gaunt.

It is difficult to prevent reed marks in plain cloth. The finer the reed, the more difficult it is to prevent them; in some cases it is impossible. This is due to the fine wire used in the reed, and to the warp not yielding readily to the finer filling when the reed is beating up. The wires of the reed swing more or less anyway.

These marks are caused when the reed beats up and the more one thinks of it the more surprising it is that they can be prevented. In the sample enclosed there are two ends in one dent; that is, each two ends are separated by a piece of wire.

The shape of the cam has a great deal to do with preventing reed marks and making a better appearing cloth. To prevent reed marks the shed should be open with the whip roll fixed on a higher plane than the center of the shed when the reed beats up. When the harnesses are set in this manner the bottom shed is tighter than the top shed; this causes the warp threads to force the filling equally between the threads, and it is only by getting the filling equally between these single threads that a full cloth can be made,

unless one thread is placed in one dent.

I do not think it possible to take out reed marks in such fine cloth as this in the finishing process. The fibers will not swell and blend with the next thread, as does wool. Mangling might overcome this defect, as this tends to spread the yarn and give the cloth a softer finish. Jean Paul.

I have found the chief cause of reed marks to be in the whip roll being too low. Another cause is having the harness level with the lay of the loom and too far away from the fell of the cloth. On light work like the sample sent I should have the lay brought up to within an inch of the cloth, and would put a rod from 1/2 to 3/4 of an inch thick on the edge of the breast beam so as to throw up the cloth at this point. I would also raise the whip roll so the yarn will slant downward to the eye of the heddle, and rise slightly from the fell of the cloth to the edge of the breast beam. If the loom is set in this manner it will cover up the reed marks. I do not know of anything that will take them out after the cloth is woven.

Jack Ready.

I have worked in a good many different mills and run up against as many different reed marks as any one. In 99 times out of every 100 I have found the loom to be the cause of the trouble.

A few years ago a commission house sent back a piece of cloth to the mill where I was fixing looms and told the superintendent if he could not make cloth without reed marks they would not handle

any more of his product. The mill was running on shirtings and colored dress goods, plain weave, 2, 3 and 4 harness work, 60s warp and 55s filling. An order had gone out from the office that the whip rolls were to be set one inch off the beam so when any looked down the room everything would be clean and neat. That was all right, but they did not get the first loom set right and that knocked the other 700 off and caused most of the reed marks. We knew what was being done, but we simply kept up our sections and when the cloth came out worse than usual with reed marks we would put on another reed and sometimes squared up the shuttle. I saw some men doing this who, I suppose, had been fixing looms before I was born.

Things ran along this way for a while and then one day the overseer called all the fixers into his office. The superintendent was in that little office too. We all knew what was coming and the expression on his face I have never forgotten. As the last man came in wiping the perspiration off his face with a piece of cop waste, the superintendent opened out a piece of cloth and laid it on a blackboard. It was filled with reed marks. "We have had kicking enough about these reed marks," he said, "to have stopped it long ago. We have spent hundreds of dollars on reeds and we have got the best in the market. I have called you in today to find out what is wrong in the weave room. I have been putting it up to the finisher, but he says it is in the weave room.

Now if any of you can solve the problem, out with it, now or never."

We all looked at each other, but nobody would speak. Finally the overseer said: "Boys, if you have got anything to say don't be afraid." That helped a little, but still nobody spoke. After waiting a few minutes longer the superintendent said, "I haven't heard anyone say anything yet." We all looked at each other again and after awhile I opened up by saying that the last mill I was in had to put a cover on the cloth, but that they didn't seem to care anything about it in this mill." By the time the superintendent asked me what cover had to do with reed marks, I began to get a little more courage and told him I thought it did have something to do with it. Then he asked me why I didn't put a cover on my cloth and I told him if I did I should have to break the rules by raising the whip rolls and moving the harness cams from the bottom center to very near the front center. I told him this would not only help to prevent the reed marks, but also the filling marks made when the weavers started up the looms after they had been stopped for a while. The superintendent told the overseer to take me to the loom that the piece of cloth came from and let me turn it upside down if I wanted to and they would look for the results.

The overseer and I went to the loom and we began by straightening out the reed, then we set the whip roll about 2 inches above the level of the lay, and when we got the harness shade

set with very little tension on the up shade, we leveled the harness and moved the lay half way from the cloth. We took off the backs of the shuttle boxes and squared them up; we also squared the shuttles and filed off the shoulder so they would not interfere with the reed if the picking stick should throw the shuttles against it. When the work was done and the loom ready to start my heart was thumping like a trip hammer, but the loom was all right and from the appearance of the cloth made on it any one would have thought it was a new style of loom.

At the end of the week, nothing having been said to me in the meantime, the cloth was taken from the loom, inspected and finished and found to be free from reed marks. Then the rest of the looms were set in the same way and a few days ago when I called around to see my old bench mates they told me they didn't have to set the whip rolls in any particular place now and they have had no more trouble with reed marks.

The sample of cloth sent me has very little cover and a cloth without cover is especially liable to be reed marked. If these goods are woven on four shafts of harness and drawn in 4-2-3-1 straight draw, the lease rods in the skip shaft, and looms run with a high whip roll, a lot of the trouble can be overcome if the reeds are not sprained and bent. The finisher cannot take out reed marks unless he can shrink the cloth in width and even then the results would not be good.

Many a good finisher has lost his job through reed marks for which he was not to blame.

Profile.

We are making some of the finest goods in the country and never have any trouble with reed marks. When I am to make a piece of cloth of fine yarn I always have the reed fine enough to draw only one in a dent. This avoids the necessity of the ends passing each other in the reeds and spreading them. I set the harness cams so the reed is up to the cloth when the harness is even and just changing; this takes the strain off the reed and helps to cover up any appearance of reed marks.

Quincy.

These marks result from various causes, the principal one being the use of an uneven or worn out reed. The best reed may be spoiled by tightening it at the bottom when it is placed in the loom; this causes the top of the reed to spring out of line with the reed cap. In such a case the reed has to be forced forward to get the cap on, which causes the dents to bind. If for any reason the dents are sprung out of their natural position reed marks in the cloth are the result.

Again they may be caused by the shuttle not being thrown true, which brings the heel of the shuttle in contact with the reed, thus damaging the wire. A weaver may injure the reed by the careless use of the reed hook; pressing the reed cap down too tight is almost sure to cause reed marks.

Another cause of reed marks is the use of a reed in which the wire is too heavy for the fabric, although the reed itself may give the required dents per inch; in other words, the steel used in the construction of the reed may be too heavy.

A hard twisted warp, particularly one combined with a heavy size, will show distinctly every dent in the reed throughout the cloth, though the reed may be perfect.

These are some of the causes of reed marks. The remedy is found in greater care. Care should be taken in the selection of the reed, and in handling it before it gets to the loom. When it is in position the greatest care should be taken by both fixer and weaver that the result may be perfect cloth. Parker.

Reed marks may be caused by unequal shedding of the harness, the whip roll being too low, the lease rods too near the harnesses, cams treading too late, or the harness cams not having the right dwell. To get the best results I would suggest using half dwell cams, as this gives ample time for the shuttle to pass through the shed, and the change of the harnesses is not so sudden as to strain the yarn. The cloth can also be woven with one side softer than the other, by reason of the filling being more prominent on that side, producing what is known as the cover. The harness cams should be set so that the harnesses are level when the cranks of the top shaft are near the bottom center. The warp should be drawn

on 4 harnesses, beginning at the front 1-3-2-4. After the drawing is completed and the warp put in the loom, make a lease with two ends under a rod. This can be done by raising the second and fourth harnesses, placing the largest lease rods through the yarn, lowering the second and fourth, raising the first and third, and placing the smallest rod through the yarn. They should be set about 6 inches from the harness and the whip roll raised 3 or 4 inches higher than the race board on the lay. In an open weave, like the sample enclosed, the best results can be obtained by drawing the warp yarn through the reed, one thread in a dent. I do not know of any way to take out these marks in the finishing process. Alpha.

In some cases reed marks can be taken out in the finishing if a coarser reed is used. After the goods have been wet and stretched the ends will sometimes slide over and separate, but in the case of the sample submitted I think the reed is a little too fine for this. A mock leno with three ends in a dent will sometimes split the ends if the pattern cannot be divided into three, in which case the third end can be brought together in the finishing. The sample enclosed is drawn on four harness and by skip shafting the warp yarn it has a tendency to separate. In most cases of trouble with reed marks we use twice as many dents.

The style of the loom also has a good deal to do with reed marks. The English looms give more cover than American looms and the major-

ity of American loom fixers run the reed too close to the cloth, whereas if they would put the crank on the bottom center when the harness is level and a little past the top back center they would get a better cover. Foster.

For weaving goods of this kind I should set the looms with the tops of the harness even, the reed 2 1/4 to 2 3/4 inches from the cloth, with the rods as far from the harness as the harness is from the cloth. When the crank is on the bottom center the race plate should be 2 1/2 to 3 inches below the breast board and whip roll. Care must be taken that there is not too much tension on the yarn. Linden.

Laying Warps in the Reed

How I shall figure on a warp so as to lay it in the comb for narrow beaming? The pattern is as follows: 10-tooth comb; warp to be laid 36 inches inside selvage, allowing 1 inch for selvage, making 37 inches in all: 24 ends (14 white, 4 black, 2 white, 4 black): warp, 366 pins white, 180 pins black. Begin with 20 white and end with 18 white. Sandford (865).

Evidently "Sandford" has left out the most vital part of his question; namely, the number of ends in the warp, so that number will have to be assumed. Assuming that it is a worsted warp and that a 15 reed 4 ends in a dent would be used, we would figure it as follows:

15/4 reed, 36 inches inside selvage; add 1 inch for selvage = 37 inches.

Pattern: white,	14		2		=	16
Black,		4		4	=	8
						24

Slightly changing the figures to conform to the arrangement, yet retaining the same pattern, we have:

White,	6		2		8	=	16
Black,		4		4		=	8
							24

15 (reed) $\times$ 4 $\times$ 36 (inches) $=$ 2,160, total in warp.

2,160 $\div$ 24 $=$ 90 patterns.

As there are 540 pins to be used, 2,160 $\div$ 540 $=$ 4 ends in each pin.

The comb has 10 teeth or 10 spaces to the inch. 36 $\times$ 10 $=$ 360 teeth. 2,160 $\div$ 360 $=$ 6 ends in each tooth.

The 20 and 18 ends white are for the selvage.

All warps will not have an equal number of ends in a pin or tooth of the comb, but the same method can be followed no matter what the division might be by simply dividing the remainder in as equal a manner as possible to prevent ridges in the warp. While the threads in the comb must be as near the same number as possible the ends in each pin are often placed according to the division in the weave.

Jean Paul.

Defects in Yarn

We would like to get your expert's advice on a cotton problem which has been troubling us for some time. The yarn concerned is 20s, 25s, 30s, and 36s, wound on tubes 5 inches long, Louisiana staple. We have used this quality for over ten years past without ever encountering the trouble mentioned hereafter.

Some two months ago we suggested to the spinners from whom we bought the yarn to use 6-inch cops, with the results that the goods came from the looms full of broken picks caused by weak places such as you will find on the cops which we are sending to you. Reducing the tension on shuttles to practically no tension, reducing the speed of looms, softening of picks, wetting of yarn, resulted in practically no improvement, as we found the yarn so weak in places that it fell apart.

Our subsequent claim on the spinners was not received in good grace, as they claim that the misspicks in the goods were caused entirely by faulty manipulation in weaving. We have no looms running faster than 160 picks on 40-inch goods and none faster than 145 picks on 60-inch goods. We believe that this defect is to be laid at the spinners' door, and it is with this point in view that we would like to obtain an expert's opinion as to the cause and remedy for the weak places. Holbrook (1156).

I find the correspondent's complaint to be thoroughly justified. At irregular intervals, throughout these cops, there are places so soft that they could not possibly cross the loom without breaking, and in many instances they would fall apart while being carefully unwound from the cop with-

out tension. These very soft spots were generally from six to eighteen inches long; there were several from three to six feet long. In four instances a stretch of twenty yards was quite unweavable. There were several instances, also, where the soft spot seemed to be for only two or three inches. Generally on each side of the unweavable spots, there would be some lengths that would draw apart much too readily, but which, without tension on the shuttle, might possibly be woven in. These weak places occur frequently even when not associated with the places which fall apart.

The lengths of the yarn on the four cops were approximately, 356 yards, 344 yards, 252 yards, and 195 yards. Each was carefully unwound, being measured at the same time, and subjected to a considerably slighter tension than any that it would have had in the loom. In this unwinding the first cop broke, or fell apart, 21 times; the second, 14 times; the third, 7 times (it was in this that the soft 20-yard length occurred), and the fourth, 7 times.

The distance between the very soft spots was most irregular. Sometimes two or three of these spots would occur at intervals of two or three yards from each other. The intervals between breakages occurred as follows: up to and including, 10 yards, 21 times; 11 to 20 yards, 11 times; 21 to 30 yards, 5 times; 31 to 40 yards, 3 times; 61 yards, once; 126 yards, once; and 143 yards, once.

The staple of the cotton seemed to be good,

and quite as good at the soft spots as elsewhere. The carding or combing was apparently well done, and the yarn was generally very level and clean. The drawing also appears to have been well and evenly executed, and the defective places were not due to any lack of fiber, or thinness at those places.

The entire trouble rests squarely in the spinning and in the faulty action of the mule spindles, so that in the very soft spots only the most trifling twist has been given to the thread, and in many other places the twist has been decidedly in-insufficient to impart the necessary strength. If the spinner will take the pains to examine the yarn thoroughly, so as to find the defective places, he will be at no loss as to the proper way to correct them. The fact that the cops were spun six inches long, instead of five inches, should have nothing to do with the matter.

The seller of such yarn as this, if he is an honest man, would make any reparation in reason as a matter of course. I cannot understand how the spinner can have assumed the attitude that he has if he has properly inspected the samples such as were submitted to me.

Considering the fact that, in two instances, I drew off 126 yards and 143 yards of yarn, respectively, without breakage, it may be that in the samples that were sent to the spinner he may have struck a sound length of yarn on each of the cops and so have fallen into the error of supposing that they were sound throughout.

The proper course to pursue is to write the spinners firmly on the subject, send them a number of cops that have proved defective, and a number of untouched ones, and ask him to have every yard of them drawn off, preferably by hand. He should then be in a position to realize that the weaver's claim was thoroughly justified. Should he still decline to acknowledge the complaint, the weaver should demand an arbitration of the matter by the Manchester Chamber of Commerce, which body would no doubt refer the samples to the Manchester Testing House for its report, and the cost of the arbitration and tests should fall upon the loser.

If this also was refused it would then be in order to transfer the business promptly to some firm that had different ideas of equity, and it might also be well in that event to send an account of the whole transaction, in detail, to the Manchester Chamber of Commerce, as a matter of record to show how the weaver had been treated.

James Chittick.

Take-Up in Weaving Kerseys

What is the percentage of warp take-up in weaving heavy weight woolen kerseys? There are 4,000 ends in the warp, and 50 picks per inch in the filling: goods weigh about twenty-six ounces per 6/4 yard, finished; woven with a broken four-leaf twill, warp dressed one and one, filling solid. Does the take-up vary on different kinds of goods? Take-Up (151).

The warp take-up on such a fabric as our correspondent describes will be about 7 per cent. The take-up in weaving varies widely with the class of goods and weave employed. On light weights it will go as low as 4 per cent., and on heavy weight beavers, woven with a plain weave back and face, and with a coarse yarn in the filling, will reach 13 per cent.

Warps Sticking to Slasher Cylinder

Lately we have had a good deal of trouble with our warps sticking to the slasher cylinder. Can you tell us how to prevent this?

Cylinder (505).

As we do not know just what style of work Cylinder is running, we shall have to give some of the usual causes for warps sticking to the cylinder and leave him to decide whether any of them fit his case. The two principal causes are found in the size and squeeze rolls. If the goods being run require a heavy size I should advise adding one pound of paraffine to every hundred gallons of water. To do this properly the wax should be shaved and mixed with a half a pail of water by boiling, and then added to the kettle of size. Be sure that the size is thoroughly cooked before using. Properly cooked size will feel smooth, like good engine oil, when rubbed between the thumb and finger, and just the least bit sticky as it cools. If it is so thick that the thumb and finger stick together there is either too much starch for the quantity of water or it has not been boiled long enough.

If the size is all right, look next to the finishing squeeze roll. This should have at least 10 yards of blanket, as follows: 3 1/2 yards of coarse blanket next to the iron roll, called No. 1; then 3 1/2 yards fine blanket, No. 2; and then 3 yards of fine blanket that has been run three days or longer, No. 3. Never put a new blanket on the outside, but when No. 3 wears out take off No. 2 and put the new one in its place and put No. 2 on the outside. This is necessary to make the yarn dry properly and not stick to the cylinder.

These are the most common causes for the trouble, but there are others that will produce it to a greater or less extent. Running the slasher too fast carries the size on to the cylinder and gums it so the yarn will stick. If there is too much cloth on the roll the yarn will break and the loose ends stick to the cylinder. After the trouble has been located it is necessary first to give the cylinder a good washing with soft soap and water. After wiping dry go over the cylinder with a piece of oily waste and then everything is ready to begin right.

Thomas Barr.

Woven and Finished Widths of Woolen Goods

Can you give me a rule for calculating the right difference between the cloth width and reed width for the common run of woolen fabrics? By cloth width I mean as it leaves the loom. Also the finished width as it reaches the buyer.

Plymouth (800).

There is no rule by which the proper woven width of a fabric can be calculated. Experience is the only guide. The difference between the woven and finished width depends altogether on the class of goods and finish required. The wider the goods are set in the loom the more must they be fulled to bring them to the required width.

Long and Short Bobbins

What advantages or disadvantges, if any, would result to the weaver or manufacturer from the use of an 8 1/2-inch bobbin instead of a 7-inch bobbin on 36s yarn? Would the use of the longer bobbin warrant any reduction in the price for weaving, and how much?

The answers which follow are of especial interest because they give the opinions of men who have a practical knowledge of weaving, and who occupy what may be called an intermediate position between the employer and the weaver. It is the duty of mill superintendents and overseers of weaving to see that both the weavers under them and the mill owners over them get fair play. The overseer or superintendent is the constant arbiter between employer and employe, and is often called upon to decide questions of far greater difficulty than that involved in a lengthening of the filling bobbin. In the replies the 7-inch bobbin is for convenience called No. 7; the 8 1/2 inch bobbin, No. 8 1/2.

1. The advantage of bobbin No. 8 1/2 over No. 7: It lessens the spinning cost as it requires less

doffing. It lessens the weaving cost as it requires less changing of shuttles when perfectly formed on a perfect bobbin, otherwise there are many disadvantages and one of the greatest is the breaking of the filling.

It seems to me that the No. 8 1/2 bobbin has exceeded the limit for good results on 36 yarn. All other things considered, I do not think there would be much advantage to either weaver or manufacturer in using an 8 1/2-inch bobbin over a 7-inch bobbin on 36 filling yarn for prints or converter's goods where the filling is usually soft.

The change from a No. 7 to a No. 8 1/2 bobbin would warrant a reduction in the price list only in such proportion as the general conditions have been improved. These conditions cannot be determined by an outsider, as they must be seen to be fully appreciated. With a good warp stop motion, automatic filling changer and a bobbin of medium length, the weaving cost can be reduced to something like 33 to 40 per cent. without reducing the weaver's pay.

3. A weaver can run the work better with the long bobbin but must look after the bobbins and take good care of them, and must not batter up the ends or cut them with a knife. If they do it will cause the bobbin to run bad on the filling frames and also cause the yarn or filling to break in the loom, so that in a short time they will have looms stopped as often as if they were using the short bobbins.

Long bobbins save doffing on frames and thus make a saving in the spinning room. How much

they reduce the labor of weaving depends on the care taken with the long bobbins. Doubtless weavers can make more money with the long bobbin, and do it more easily than with the short one, but I cannot state positively what reduction of the price list would be warranted by the lengthening of the bobbin.

9. This is a question that has been before mill men for years. They have been wondering where the limit was in getting more yards into a compact state in order to save handling, which means saving labor and cost. There is but one way to find this out and this is to make a thorough test, and with the present question the test means beginning at the spinning frame. Now if the yarn was made just as good on the 8 1/2-inch bobbin as on the 7-inch bobbin the weaver could run twelve looms about as easily as she could run eight the old way, but in this case it is not as good on the large bobbin as on the small one. I find that while the bobbin is but one and a half inches longer and has more than double the yards on it, it must have been made on a larger ring, therefore the yarn is not as good. In all my experience I have never seen as good No. 36 yarn made on a 2-inch ring as on a 1 1/2 inch ring with the same speed of spindle. Therefore more breakages at the loom.

The shuttle should be as much longer in proportion as the difference in the length of the bobbin. Even at that there will be more breakages caused by the yarn ballooning against the shuttle and dragging around the end of the long bobbin, than with

the short bobbin. Neither are the warp stop motions all sunshine, but the advantages overcome the disadvantages, so it is certainly an improvement by making better work And it is easier for a weaver to step up to a loom and tie in an end than to look around and see one running with one or more ends out, especially when it has been running quite a while and has to be scratched up so it will not show in the cloth, as is often the case without the stop motion.

Furthermore, in using the long bobbin it requires closer attention to the management of the machines. First, in the spinning room where the build of the bobbin must be just right. Second, in the weave room, where the shuttles must be kept in perfect condition and bobbins must be kept perfectly smooth. It is also necessary to prevent all other imperfections as much as possible, as they will show up on the long bobbin and cause the loom to stop, where they would not on the short bobbin. If these requirements are fulfilled a weaver can run ten looms as easily as eight of the old style, which means a 20 per cent. reduction of help on looms,—a very important factor in the cost of weaving.

10. I cannot speak from experience on this question as I have not used any of the long bobbins, but I see no reason why they should not be a success if proper attention is given to the wind and taper in the spinning room. The filling breaks when weaving from No. 7 as well as from No. 8 1/2, causing pieces, waste and loss of time. I should think the long bobbin would warrant a re-

duction of from 12 to 15 per cent. in wages, as it runs so much longer than a short one.

11. Both weaver and manufacturer are gainers by the use of bobbin No. 8 1/2 instead of bobbin No. 7. No. 8 1/2 runs twice as long without a stop, thus increasing the weaver's earnings, by reason of fewer stoppages of the loom, which means a larger production. The manufacturer is equally a gainer by reason of increased production, which means cheaper cost per pound, also by reducing his chances of making seconds from filling change imperfections, a serious fault in light pick goods. The No. 8 1/2 bobbin reduces the chance of these imperfections 50 per cent. and gives the manufacturer a better cloth.

I am hardly prepared to give an opinion as to wages, but it seems as if the manufacturer should get some benefit from the improvement. Bear in mind, however, that the long bobbin relieves the weaver only from changing the filling as often, but it does not relieve him in other parts of the work. I think the reduction of wages for benefits received by the weaver should be small.

14. At first sight it seems as if No. 8 1 2 gave a long gain over No. 7, but the greater tendency of the yarn to break at the bottom of the bobbin would materially lessen the gain.

The long bobbin would warrant a certain reduction in the price list for weaving, but this could be determined only by a trial with bobbins on a few looms.

23. From my own experience the long bobbin offers no advantage to either side. More yarn is put on a long bobbin it is true, but when it gets about three-fourths empty the yarn generally breaks and the majority of the weavers will not put the piece in the loom again. I fail to see why a long bobbin should warrant a reduction in the price for weaving, even if all the yarn ran off. I have 780 looms under my charge all equipped with stop motions. A weaver runs from 10 to 12 looms and I know for a fact that they are working harder and getting less pay than the weavers who are running only eight looms in other mills on the same class of goods. For both quantity and quality I will back my looms against any other mill in New England.

24. The use of the long bobbin is to my mind a mistake and I do not think it has come to stay. I am sure that four looms fitted with the long bobbin would need considerably more attention than four looms fitted with the old 7-inch bobbin. There would be more breakage in warp threads due to the increased thickness of shuttle as the new bobbin is thicker. We must have larger shuttles and larger sheds, and so strain the warp threads. The increased weight of bobbin and shuttle do not tend to lessen the breakage in the bottom part of the shed.

There would be more breakage in filling, due to the extra length of bobbin, as the yarn will not come over the nose of the bobbin as it should when the bobbins get about three-quarters finished. The last quarter would cause more trouble for the weaver and cause more broken picks than would

be the case if the weaver had only to change shuttles as she would with a 7-inch bobbin. Then again the cumbersome weight and length of the new shuttle is against quick shuttling. If a weaver must mind more looms she ought to be able to shuttle more rapidly.

These few items account for the disadvantage to the weaver, but there is a greater disadvantage to the manufacturer. The strain on heddles, lingoes, reed and extra power required in picking will make extra cost in mill stores, also worse cloth will be the result.

If the Fall River manufacturers had been satisfied, for the present, with adding the stop motion, it would have been more satisfactory to all. Adding the disadvantages of the long bobbin to the advantages of the warp stop motion makes it about equal to the old conditions. I do not see how a reduction can be made and be fair to all.

36. There can be no fixed rule on such things. If the material is extra thick, naturally longer bobbins are desirable; if it is reasonably fine, however, there is no particular advantage in long bobbins, and there may be a distinct disadvantage. The finer yarn is more expensive, and if anything happens to the bobbin, by which much of it is wasted, the percentage of waste would be increased.

Another thing is the interchangeability of the work and material. For instance, it might on certain work be profitable to use very long shuttle bobbins, and yet on the bulk of the work in the same mills it might not be desirable to use such long

ones. The fact of having some bobbins, shuttles and loom boxes, perhaps, of a different length than the others might be more than an offset to the advantage to be gained on that portion of the work where the longer bobbin would seem to be advantageous.

It goes without saying that if a mill were to run steadily on a certain fabric (of material of compartively low cost), that the longer the shuttle can run without changing the greater the production and the less the waste, but there are very few mills whose production is one thing all the time. Matters of this kind can be determined only by the managers of each mill.

We do not believe that any reduction in wages can be effected by this difference in the shuttle bobbins, as it would not be sufficient in any event to cut much figure in the production.

30. The shorter the bobbin the more uniform is the tension of the filling during weaving. The filling motion is adjusted to suit a certain amount of tension on the filling. If the filling is very slack to start with it will not raise the fork on the stop motion and the lever will not pass under the fork. Consequently the loom stops. This difficulty may be caused by the long bobbin, when full, giving less tension than is required. When half full the tension is suited to the filling stop motion. When the bobbin nears the end the strain is so great it is at the breaking point.

INDEX